UH-60A Recapitalization/ Rebuild Program — The First Steps to Recapitalizing the UH-60 Fleet

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BEST BUSINESS PRACTICES

Paratroopers from 82nd Airborne Division's 3rd BCT pass by a Black Hawk helicopter at Rifle Base in Al Asad, Iraq, on their way to get equipment for the airborne assault operation to demonstrate joint U.S. capabilities for rapid deployment/redeployment anywhere in the world to support the war on terror during *Operation Iraqi Freedom*, Feb. 24, 2004. U.S. Army photo by SSG Charles B. Johnson, 982d Signal Company.

The UH-60 Black Hawk helicopter has served the Nation faithfully and with great distinction in peace and war during the past quarter century. As the Army's workhorse utility helicopter (UH), its missions include air assault, general support, command and control, combat search and rescue, special operations and air medical evacuation. It has performed these missions in Grenada, Panama, Somalia, Bosnia, Kosovo and in *Operations Desert Shield* and *Desert Storm*. In the past 10 months, during *Operations Enduring* and *Iraqi Freedom*, Black Hawks have flown more than 92,000 flying hours and evacuated 2,467 patients. While known for its ruggedness and reliability, the oldest aircraft in the fleet are now more than 25 years old and are showing the wear and tear of time and hard work. The UH Project Manager's Office (PMO) designed the UH-60A Recapitalization (Recap)/Rebuild Program to address these issues.

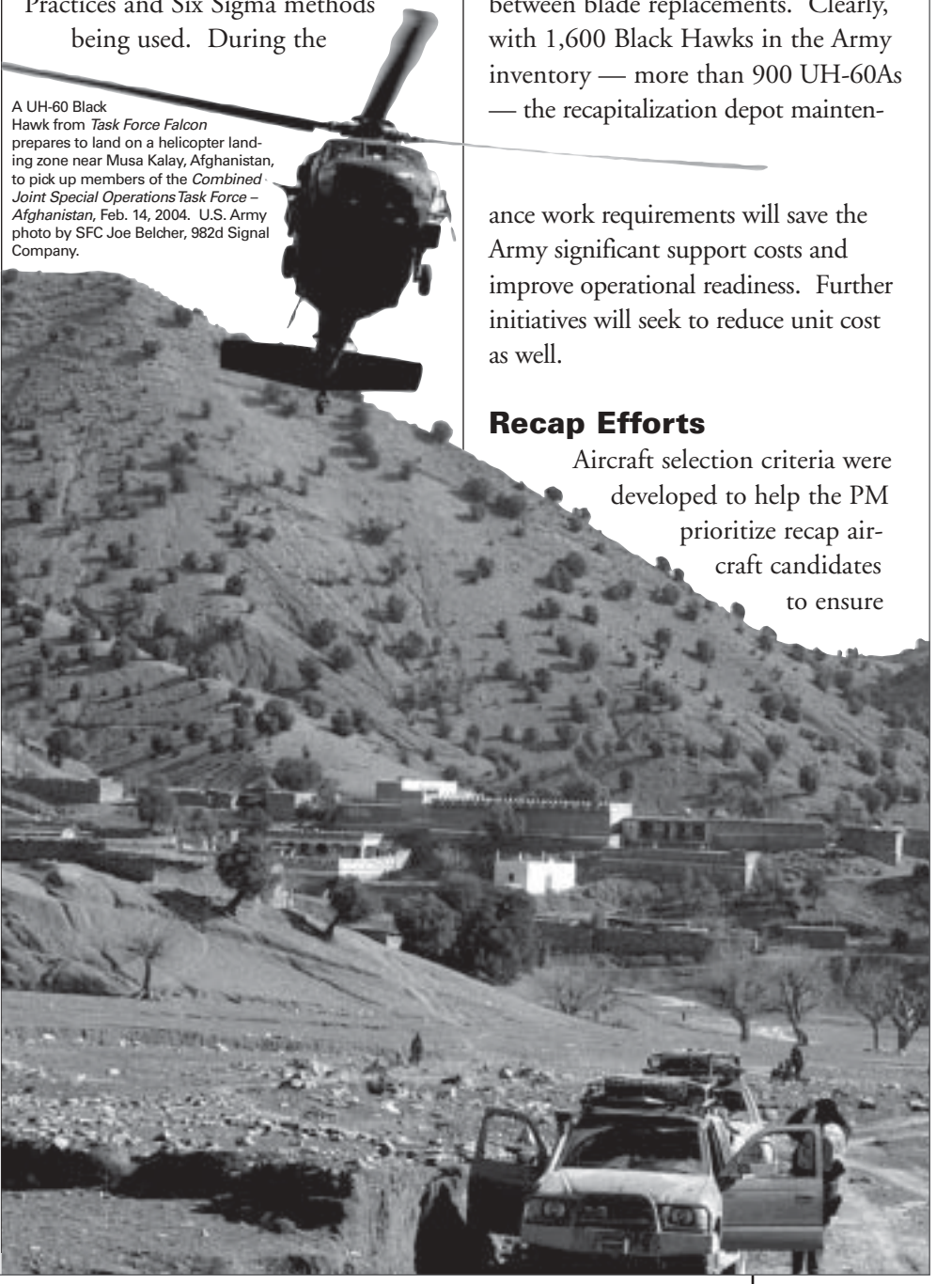
The UH-60A Recap/Rebuild Program is a $1.2 billion effort to rebuild 193 UH-60A aircraft at Corpus Christi Army Depot (CCAD), TX, between FY02 and FY13. The program's purpose is to sustain the fleet until induction into the UH-60M Recapitalization/Upgrade Program. The program has two elements: airframe recapitalization and components that both support the airframe recapitalization and sustain the remaining UH-60 fleet. The ultimate goals are to extend aircraft service life 10 to 15 years, improve reliability, reduce operations and support cost rates and enhance operational safety. This article describes the program and its many initiatives such as recapitalization standards, depot and industry partnerships and "lean" practices.

Partnerships and Standards

A joint UH PMO, CCAD and Sikorsky Aircraft Corp. (SAC) team evaluated the airframe in 2000 to ascertain focus areas during the recap/rebuild process to meet the goal of producing "like-new" aircraft. The evaluation resulted in an improved airframe structural assembly that mitigates many field-experienced deficiencies.

The U.S. Army Aviation and Missile Command (AMCOM) and U.S. Army Communications-Electronics Command (CECOM) supported the initiative by analyzing the depot-level repairable (DLR) aircraft components to determine potential recapitalization benefits. The review encompassed more than 98 components whose mean time between replacement (MTBR) after multiple overhauls had fallen significantly below the rate experienced between new and first overhaul. An engineering team analyzed each DLR to determine whether MTBR could be restored to like-new performance. This standard maintains the current configuration for the item — the design of the item may not change — but may tighten tolerances or increase mandatory replacement items during the overhaul process. This effort established recapitalization standards for 75 AMCOM airframes, 10 AMCOM engines and 13 CECOM DLRs.

The T700 engine and main rotor blades were among the first components to receive recapitalization standards. A partnership with General Electric (GE) Co. was established for the engine line with Best Commercial Practices and Six Sigma methods being used. During the review process, the engineering team's goal was to implement changes to restore overhauled engine life to at least 1,500 hours between first and second overhaul. The partnership reduced turnaround time from 300 to 100 days and improved T700 turbine engine life from 309 hours to more than 900 hours MTBR. Likewise, the main rotor blades were being replaced at 100 hours after the third overhaul. The lead-the-fleet aircraft at the U.S. Army Aviation Center and School are now averaging more than 700 hours between blade replacements. Clearly, with 1,600 Black Hawks in the Army inventory — more than 900 UH-60As — the recapitalization depot maintenance work requirements will save the Army significant support costs and improve operational readiness. Further initiatives will seek to reduce unit cost as well.



A UH-60 Black Hawk from *Task Force Falcon* prepares to land on a helicopter landing zone near Musa Kalay, Afghanistan, to pick up members of the *Combined Joint Special Operations Task Force – Afghanistan,* Feb. 14, 2004. U.S. Army photo by SFC Joe Belcher, 982d Signal Company.

Recap Efforts

Aircraft selection criteria were developed to help the PM prioritize recap aircraft candidates to ensure

the entire fleet's readiness was supported. These criteria were safety, the aircraft's airframe condition evaluation score, the aircraft configuration, depot history and force structure considerations.

The first recap Black Hawk flew out of CCAD in August 2003 and was issued to Fort Rucker, AL, as part of the school fleet refreshment program. The aircraft was fitted with 75 DLR components that were recapitalized like new, including the GE/CCAD partnership-produced engine, main rotor blades and main transmission with improved planetary carrier. The airframe alignment was verified and a structural enhancement assembly applied to the cockpit, cabin, transition, tailcone and pylon areas to minimize potential depot-level maintenance requirements. Fresh paint and the replacement of more than 120 non-DLR items including new fuel cells, interior, windscreens, wheels and tires completed the "new-from-the-factory" look.

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Lean Practices

In 2002, the Army Materiel Command (AMC) Commander directed that all commodity commands implement lean practices. AMC's lean efforts have grown from the traditional lean production approaches espoused in the 1980s by Toyota executive Taiichi Ohno (now retired). The lean philosophy boils down to reducing waste, turnaround time and costs; improving quality and eliminating nonvalue adding processes.

CCAD began implementing lean practices via the Black Hawk recap/rebuild program by using an integrated product team (IPT) consisting of depot, UH PMO, Defense Logistics Agency (DLA) and AMCOM personnel. The team developed a 3- to 5-year plan to eliminate waste in the recap/rebuild program. Realizing that 5 years was too long, and such a delay was a form of waste itself, they developed a 6- to 12-month plan to reap immediate benefits.

CCAD's challenge was significant. Turnaround time for the first recapitalized Black Hawk program was 327 days. CCAD planned to reduce that to 211 days by February 2004 and to 150 days by March 2005. Implementation effectiveness measures were developed to include defect quantity and type, time-in-flight test, customer satisfaction, component time-on-wing, DLR removal rate, maintenance man-hours/flight hours and aircraft mission capability rates.

Among the major areas the Lean IPT identified to improve and reduce waste was aircraft flow between processes. Each aircraft was moved 30 times, through 8 buildings, for 5.5 miles through 213 steps. Parts storage and retrieval was a contributing challenge. Parts were delivered to

U.S. Army UH-60 Black Hawk crew members from the 1/126th Aviation Regiment, Rhode Island Army National Guard, prepare the aircraft after arriving from the U.S. aboard the High Speed Vessel (HSV) 2 "Swift" at Puerto Cortes, Honduras, during the Joint Logistics Over the Shore (JLOTS) exercise Feb. 24, 2004. U.S. Army photo by Kaye Richey, U.S. Army South.

the assembly area before they were required, leading to clutter, damage and loss, which further slowed the assembly process.

In its quest to reach a 211-day turnaround, CCAD consolidated all major processes — disassembly, intermediate maintenance, structures/electrical and assembly — in one building, thereby reducing the number of times the aircraft is moved from 30 to 8. Personnel supporting these processes, such as quality and production control, are collocated to further reduce the time spent on defects, motion and transportation. These steps alone have accounted for a 61-day reduction. Other 211-day target enablers are automating the flight preparation and support area, adding a second shift and improving parts flow to ensure parts are delivered to an assembly area when they are actually needed.

To address the increased flow of airframe parts required for the program, an industry-government partnership was formed between SAC and CCAD. Under this agreement, SAC will become the materiel integrator for Black Hawk programs, providing components, parts and assembly-supporting hardware kits. SAC's role will be to provide inventory management, support to the production line and parts movement. Responsibilities include reducing repair turnaround time, increasing quality and operating time of repaired components. Ultimately, SAC will establish a true "pull" parts process using a Web-based customer ordering system. Combined with the GE/CCAD partnership, this should streamline the logistics infrastructure and provide more responsive, cost-effective support to the depot.

A key enabler to reaching the 150-calendar-day turnaround time is modernized equipment. One example is a second alignment fixture, which reduces the time to verify alignment after structural work is completed, builds efforts into the repair requirements and reduces possible rework. Additional enablers are continued lean rapid improvement events to reform processes and automation.

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The UH-60A Recap/Rebuild Program and lean practices implemented by CCAD and its partners are helping to ensure continued fleet readiness. Recapitalized components are exceeding initial engineering estimates, thereby improving reliability and slowing the rise in operations and sustainment costs. Improved production quality and faster turnaround time are ensuring airframes are quickly and efficiently returned to warfighters. Black Hawk recap/rebuild is spearheading Army aviation recapitalization. The initiatives highlighted here show that Black Hawk products will surpass the desired results and indicate the benefits to be gained by other aviation systems as they undertake their recap efforts.

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